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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Reforms and Refinements, and Establish Forward Resource Adequacy Procurement Obligations	Rulemaking 21-10-002 (Filed October 7, 2021)

COMMENTS OF FORM ENERGY, INC. ON THE ORDER INSTITUTING RULEMAKING TO OVERSEE THE RESOURCE ADEQUACY PROGRAM, CONSIDER PROGRAM REFORMS AND REFINEMENTS, AND ESTABLISH FORWARD RESOURCE ADEQUACY PROCUREMENT OBLIGATIONS

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Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Reforms and Refinements, and Establish Forward Resource Adequacy Procurement Obligations.	Rulemaking 21-10-002 (Filed October 7, 2021)

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I. Introduction

In accordance with the Rules of Practice and Procedure of the California Public Utilities Commission ("Commission"), Form Energy respectfully submit these comments on the *Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Reforms and Refinements, and Establish Forward Resource Adequacy Procurement Obligations* ("OIR"), issued October 7, 2021.

Form Energy, Inc. (Form Energy) appreciates the Commission's continued effort to reform and restructure the Resource Adequacy ("RA") proceeding to ensure both near and

long-term grid reliability as California transitions to a fully renewable and zero carbon grid. However, the preliminary Scoping Memo delineates a proceeding that would continue to pursue ongoing reforms without first addressing the need for foundational analysis that is necessary to enable more substantial long-term reforms to ensure long-term resource adequacy. In these comments, Form Energy recommends that the Commission amend the scope of Rulemaking (R.)21-07-014 ("Scope") in the following ways:

- The Scope should clarify that refinements adopted in the Implementation Track apply only to the current RA framework, which is focused on near-term reliability, and not to long-term resource adequacy.
- The Scope should be expanded to include an Analysis Track dedicated to studying a number of issues crucial to informing long-term RA program reform and ensuring that any adopted RA framework will maintain reliability both in the near term and in the deeply decarbonized grid of the future. This expanded analytical track should:
    - Define and characterize long-term reliability risks
    - Define reliability metrics and characterize system needs
    - Characterize necessary resource performance needed to deliver firm capacity during periods of reliability risks
- The Reform Track should include the following:
    - an assessment of whether the "slice-of-day" framework, as detailed in the scoped Reform Track Workshop Report, is durable enough to ensure

reliability over the long term, including as reliability risks may shift from summer to winter and from single-day events to multi-day events, or should be considered an interim proposal, and

    - if the "slice-of-day" proposal is deemed to be an interim proposal, a determination of whether its incremental benefits merit the administrative complexity and potential cost and risk of its implementation.

- The Scope should be expanded to include a Long-Term Resource Adequacy Reform Track that considers how the RA Program should be refined to address California's long-term electric reliability risks and to align with the timelines and portfolios of the Integrated Resource Planning ("IRP") process.

II. Interest in Proceeding

Form Energy is developing a new class of multi-day energy storage systems to enable a clean electric grid that is reliable and cost-effective year-round, even in the face of multi-day weather events. Our first commercial product is a rechargeable iron-air battery capable of continuously discharging electricity for 100 hours at system costs competitive with conventional power plants and at less than 1/10th the cost of lithium-ion battery storage. Form is headquartered in Somerville, MA, with offices in the San Francisco Bay Area and the Greater Pittsburgh area.

Multi-day battery energy storage can reduce electric system costs and improve grid reliability as California transitions to a lower carbon grid. Form Energy's multi-day iron-air battery storage is a non-emitting resource that can provide a source of clean, dispatchable energy

to firm renewable energy resources at the project or portfolio level, eliminate needs for existing and new fossil-fueled power plants, and improve the utilization of the transmission system.

III. Comments

A. Implementation Track

We support the inclusion of an Implementation Track in this proceeding to continue making incremental refinements to the RA Program as long as these refinements are characterized as changes to the Commission's existing short-term reliability framework. The Commission should clarify in the proceeding scope that the issues it proposes to address in the Implementation Track, including refinements to the Planning Reserve Margin (PRM), Qualifying Capacity (QC) counting conventions, and Effective Load Carrying Capability (ELCC) calculations, should apply only to the existing short-term RA program, which is designed to address short-term reliability needs less than five years into the future, and should not be considered the basis of longer-term reforms intended to address long-term resource adequacy.

Before the Commission can make reasonable decisions about reserve margins, resource accreditation methods (like QC and ELCC), and resource adequacy frameworks that are appropriate to ensure both reliability and just and reasonable rates in the long-term, the Commission must first characterize how reliability risks are likely to change over the long-term. Until the Commission has conducted such analysis, it should constrain the scope of the Implementation Track to pertain to the existing short-term RA program, while work progresses on the Analysis Track we recommend the Commission initiate..

B. Analysis Track

The Commission has sought to reform and improve the RA program for a number of years. While this effort has been met with some success, reforms have largely been incremental and focused on near-term reliability risks, while significant concerns about both longer-term reliability risks and system cost persist.

We recommend that the Commission revise the proceeding scope to commit the Commission to taking two initial steps that are necessary to inform long-term RA structural reforms: 1) Commit in the "Reform Track" to reforming the RA program with a view toward long-term reliability risks over a period that aligns with the period of the Integrated Resource Planning process, which we recommend should extend to 2045 to align with Senate Bill 100; and 2) Commit to conducting detailed analysis of long-term reliabiltiy risks and how they may vary by season and over time as the system portfolio changes. This analysis should be conducted as an "Analysis Track" that should precede considerations of RA reforms focused on long-term resource adequacy.

If the Commission wishes to develop a RA program that ensures reliability, minimizes costs, and proves durable against the emerging challenges posed by increased reliance on variable renewable energy resources, it must perform the foundational analyses needed to identify requisite performance at both the system and resource level to ensure the system can maintain energy sufficiency during a range of future reliability risks. While we appreciate the party-driven analysis that is ongoing as a part of the Reform Track Workshops, Form Energy believes that the analyses listed below must be done by the Commission, the California Energy Commission (CEC), and/or the California Independent System Operator (CAISO). Agency

engagement and leadership are necessary in order to provide transparency to all parties and ensure that the results are vetted by appropriate public processes.

The Analysis Track should be initiated promptly after the issuance of the Scoping Memo and should address at least the following issues:

a. Define and characterize long-term reliability risks

California's RA program was designed to ensure sufficient capacity to meet single-day demand peaks. The grid has changed, however, and the nature of reliability risks has changed with it: renewable resources and energy storage have rapidly proliferated; atypical weather events are becoming increasingly common; both generation and load are affected by weather; and thermal resources are often under-performing relative to expectations.

Multiple long-term reliability studies[1] point to a shift in reliability risks: grids must ensure reliability not only during summer peaks but increasingly during the winter and traditional "shoulder" seasons, when multi-day renewable energy lulls can occur coincident with other events (periods of high load or thermal outages). Reliability challenges now have two dimensions: grids must both satisfy single day net demand peaks and maintain energy sufficiency during multi-day periods of generation scarcity.

In order to design a robust RA program, the Commission must characterize multiple emerging reliability risks and how these risks may change over seasons and years including, at

[1] See, among others: *Long-Run Resource Adequacy under Deep Decarbonization Pathways for California* (https://www.ethree.com/wp-content/uploads/2019/06/E3_Long_Run_Resource_Adequacy_CA_Deep-Decarbonization_Final.pdf) and K. Rinaldi, et al., *Wind and Solar Resource Droughts in California Highlight the Benefits of Long-Term Storage and Integration with the Western Interconnect* (https://pubs.acs.org/doi/10.1021/acs.est.0c07848).

minimum, 1) flexible ramping needs to meet net peak load, 2) multi-day renewable energy lulls, 3) multi-day periods of high demand and extreme temperature; 4) planned or unplanned fossil outages and their coincidence with other grid events, including renewable energy lulls and atypical weather. We recommend that the Commission examine multiple years of weather data, not only typical or average years. This study should be designed to help the Commission understand the magnitude and duration of reliability risks that will occur as frequently as once in at least 10 years. However, to account for increasingly uncertain weather patterns, Form Energy recommends studying weather events and reliability risks that are likely to occur at least once in 20 years.

b. Define reliability metrics and characterize system needs

Following the characterization of existing and emerging reliability risks, the Commission should define reliability metrics that are appropriate for the long-term and characterize system needs by taking the following steps:

- assess the appropriateness of various target reliability standards (e.g. loss of load hours or unserved energy) for assessing portfolio and system-level reliability and accurately capturing the impacts of multi-day reliability events,
- determine what system performance constitutes a sufficient level of reliability,
- and assess the aggregate resource needs, both in terms of gigawatts (GW) of capacity and gigawatt hours (GWh) of energy, and reserve margins necessary to achieve a sufficient level of reliability.

The Commission's current use of a 0.1 loss of load expectation standard and a legacy PRM framework do not provide the Commission with an adequate basis to ensure that it is planning prudently. It should consider these issues in detail with a few to long-term grid changes before engaging on issues related to long-term RA program reforms.

c. Characterize necessary resource performance needed to deliver firm capacity during periods of reliability risks

Before the Commission can resolve questions about the appropriateness of various resource accreditation metrics (e.g. exceedance or ELCC), the Commission should first define through analysis what performance a resource (or a resource portfolio) must deliver to provide firm capacity (i.e. high availability energy) during periods of high reliability risks.

For example, Form Energy conducted a study of the historic frequency and duration of renewable energy lulls in California (defined as a sustained multi-day drop of at least 25% from the historic average), and we found that 50-hour lulls occur every year, and 100-hour lulls occur at least once every 10 years. Based on this preliminary analysis, we recommended that, in California's context, a firm, dispatchable resource should be defined as a resource guaranteed to deliver its contracted capacity for at least 100 continuous hours if called upon any day of the year.[2]

Through better characterizing long-term reliability risks and the performance that resources and portfolios need to deliver to support long-term grid reliability, the Commission can

[2] *See* Form Energy's Opening Comments on Administrative Law Judge Ruling Seeking Feedback on Mid-Term Reliability Analysis, March 26, 2021, and Form Energy Opening Comments on Proposed Decision to Address Mid-Term Reliability, June 10, 2021, California Public Utilities Commission

set more durable resource accreditation rules that will create a more stable and transparent market that is necessary to develop the diverse portfolio of resources California needs to meet its long-term climate goals..

C. Reform Track

Form Energy acknowledges that progress has been made on the RA framework reform effort, previously Track 3B.2 of R.19-11-009, that is continued via its inclusion in the scoped Reform Track. However, the "slice-of-day" proposal, which has been adopted in concept, represents largely incremental progress, and there is no record to justify adopting this framework as a method to ensure long-term reliability. As discussed above, in order to ensure that a RA framework is durable over an extended period of changing grid conditions and provides long-term reliability, reforms must be based on a characterization of existing and emerging reliability risk. The Commission should leverage the outcomes of the Analysis Track before undertaking more substantial long-term reforms in the Reform Track. Upon completing the Analysis Track, the Commission should assess whether the "slice-of-day" framework, as detailed in the scoped Reform Track Workshop Report, is durable enough to ensure reliability over the long term or whether it should only be adopted as an interim proposal. Moreover, if the "slice-of-day" proposal is deemed to be an interim proposal, the Commission should make a determination as to whether its incremental benefits merit the administrative complexity and potential cost and risk of its implementation.

D. Long-Term Reform Track

To realize California's goal of building an affordable, reliable, fully renewable and zero carbon electric grid, the RA program must begin to take the long-view of California's seasonally-varying, multi-day reliability risks. While Decision (D.)21-07-014 made explicit that the current reform effort (formerly Track 3B.2 of R.19-11-009) must be implementable by 2024, Form Energy is concerned that the near-term implementation timeline is unduly limiting the scope of the reforms under consideration. We recommend that the Commission commit to restructuring the RA program with a view towards California's long-term electric reliability risks and long-term resource portfolio mix by expanding the scope of Rulemaking (R.)21-07-014 to include a Long-Term Reform Track. In this Track, the Commission should consider the structural changes necessary to ensure reliability in a deeply decarbonized grid, especially during multi-day periods of reduced renewable generation and extreme weather events. This Track should consider the extension of the RA program timeline to align with IRP and evaluate the merit of expanding beyond the current RA program's narrow three-year-ahead view. In addition, this Track should address how to best coordinate the RA program with IRP, since the programs are highly interrelated, and consistency between the two is essential to long-term reliability.

This Track should commence no sooner than late March of 2022, following the filing of Comments and Reply Comments on the short-term Reform Track Workshop Report and the completion of the Analysis Track that we recommend.

IV. Notice

For the purpose of receipt of all service of notices, orders and other correspondence in this proceeding, the following representative for Form Energy should be placed on the service list as a "party":

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V. Conclusion

Form Energy appreciates the Commission's commitment to restructuring the RA program and addressing reliability risks, and we look forward to continuing to work with the Commission on these issues.

Respectfully submitted,

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